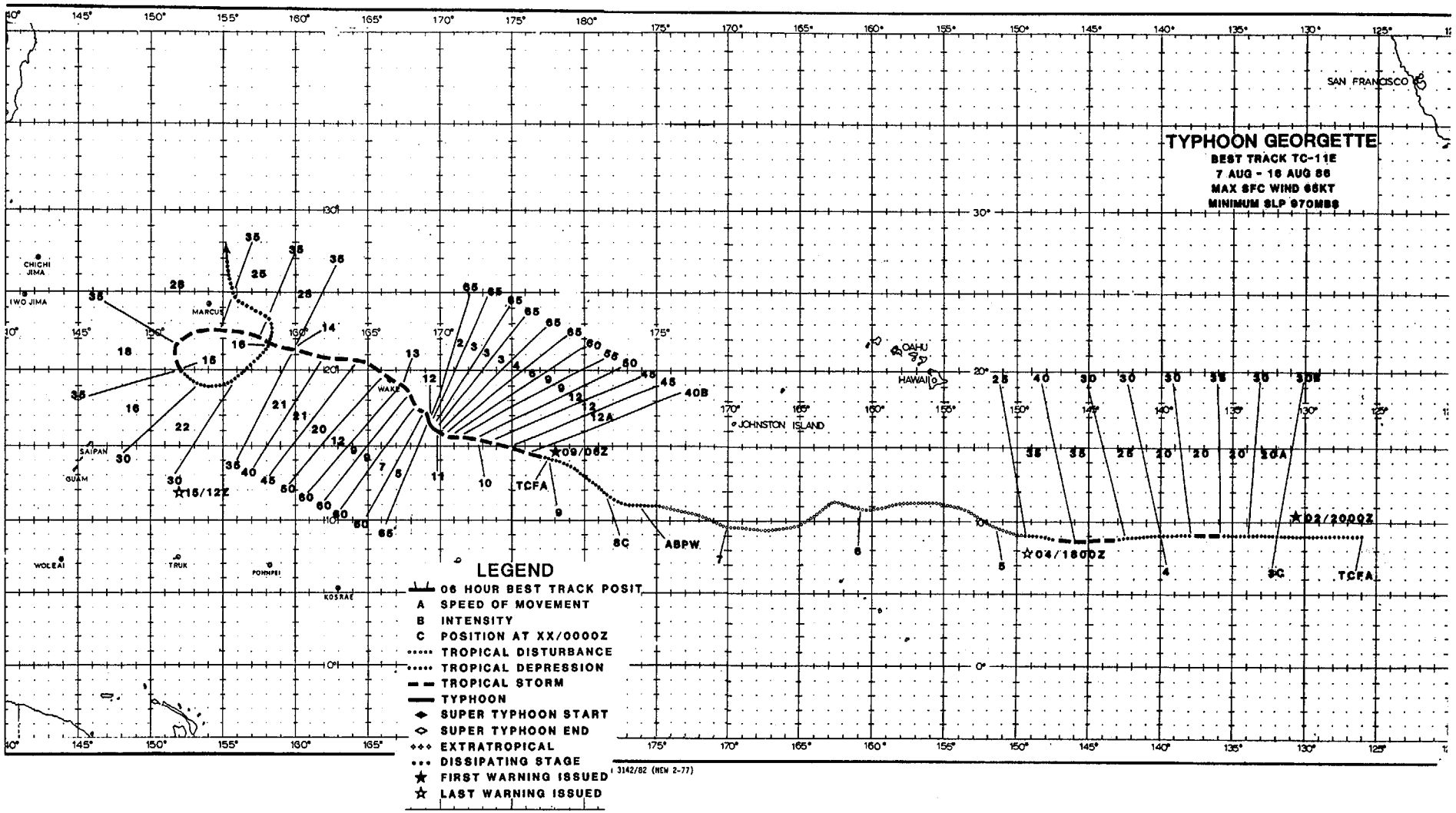

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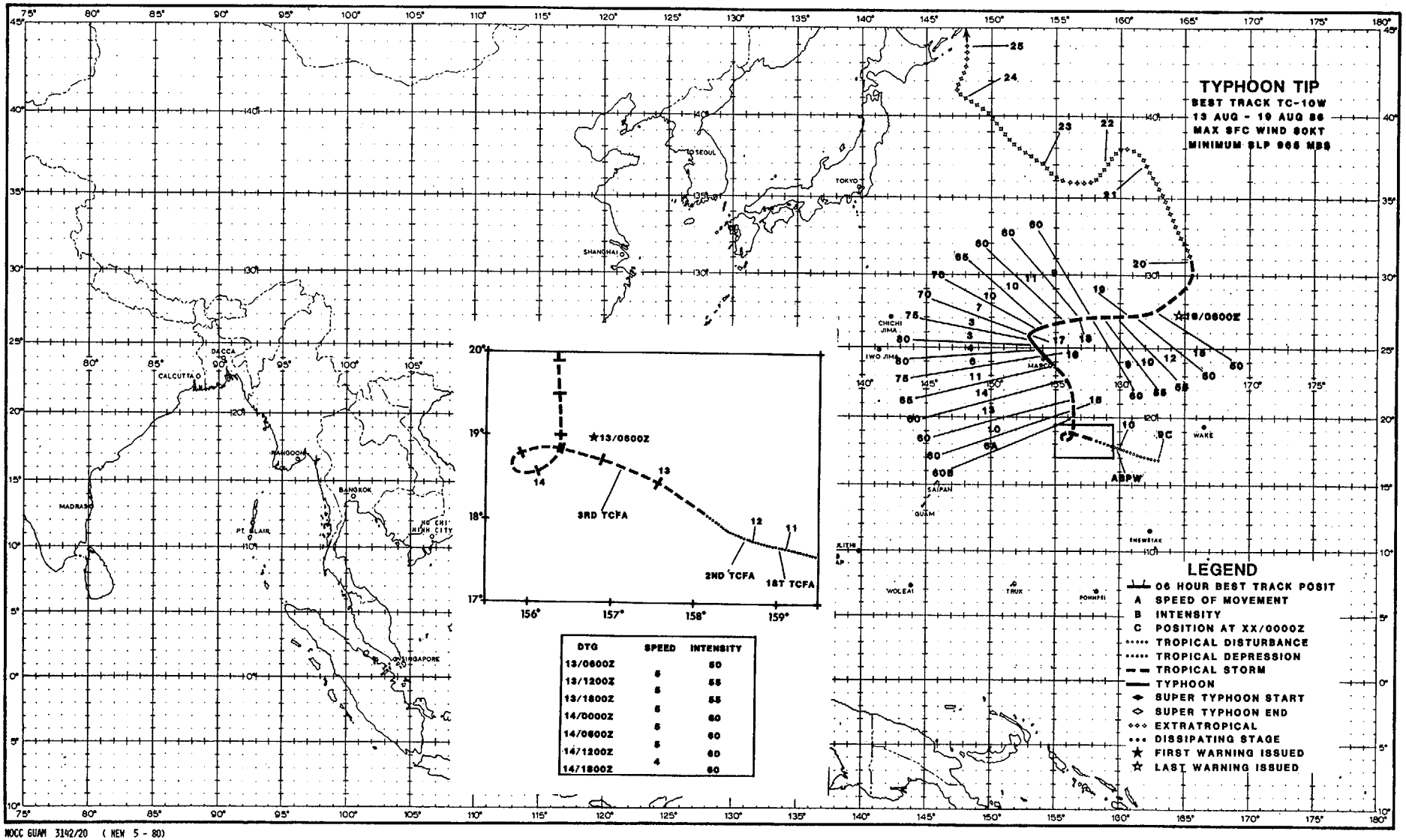

NOCC GUAM 3142/20 (NEW 5 - 80)

Typhoons Georgette and Tip provided one of the more intriguing forecasting opportunities of the 1986 western North Pacific Tropical Season for JTWC as they circled one another in a complex binary interaction. Georgette was a rare tropical cyclone which traveled from the eastern North Pacific region across the central region and became a typhoon in the western region (see Figure 3-10-1). During its two-week lifespan Georgette traveled nearly 5,600 nm (10,371 km).

Typhoon Georgette had an interesting early history. It began as a tropical disturbance in the eastern North Pacific 1,600 nm (2,963 km) south-southwest of Los Angeles on August 2nd and initially moved westward. The Naval Western Oceanography Center located in Pearl Harbor, Hawaii issued a Tropical Cyclone Formation Alert (TCFA) on the system at 020700Z after observing convective bands on satellite imagery. Later that same day, at 022000Z, the Eastern Pacific Hurricane Center (EPHC), located in San Francisco, issued the first advisory on Tropical Depression 11E. The system was upgraded to Tropical Storm Georgette (11E) on the fourth advisory at 031500Z, then downgraded to a tropical depression again on the fifth through seventh advisories when a decrease was noticed in the amount of convective organization. It was upgraded once more to a tropical storm on the eighth advisory and then finally downgraded for the last time and forecast to dissipate over water on the ninth advisory as it passed south of Hawaii. The Central Pacific Hurricane Center (CPHC) issued the sixth through ninth advisories after Georgette had moved into the central North Pacific. A total of nine advisories were issued on Georgette by EPHC and CPHC combined. All nine corresponding tropical cyclone warnings for the Department of Defense customers were issued by the Naval Western Oceanography Center.

Georgette maintained its identity as a tropical disturbance after the final downgrade and was tracked by JTWC before it crossed the dateline. It was first mentioned at 071500Z on the Significant Tropical Weather Advisory (ABPW PGTW) as a 20 kt (10 m/sec) disturbance 420 nm (778 km) southwest of Johnston Island. It crossed the dateline on 8 August while moving on a northwestward trajectory.

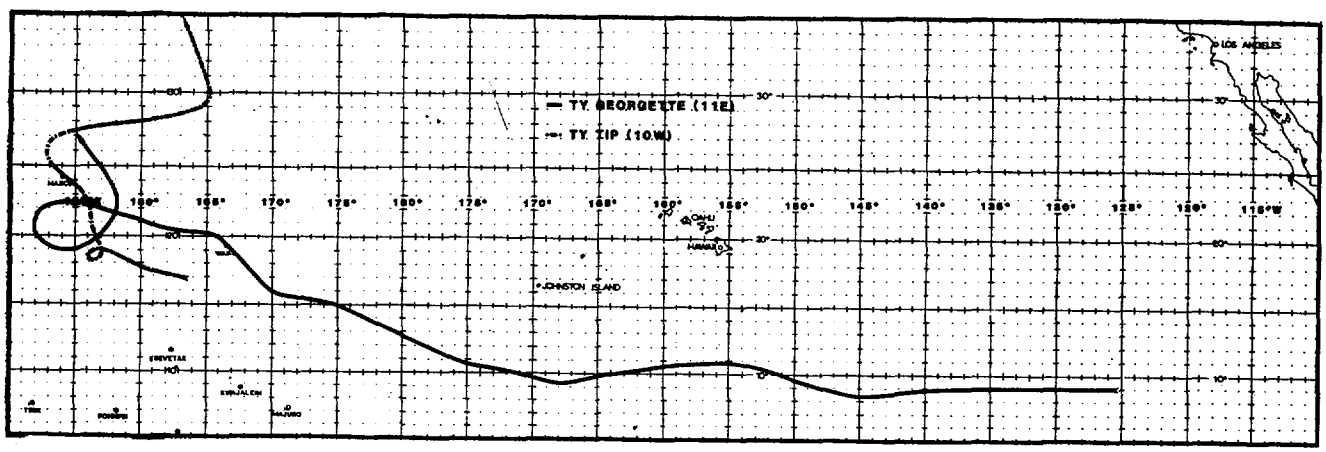

Figure 3-10-1. A composite plot of Tip's and Georgette's best tracks shows how closely linked the two were at the end of Georgette's long journey.

JTWC issued a TCFA on regenerated Tropical Storm Georgette (11E) at 090130Z based on analysis of satellite imagery which showed improved organization. A few hours later, JTWC followed with its first warning (#10 on the system), valid at 090600Z, when Georgette re-developed a central dense overcast.

The aircraft reconnaissance investigative mission into Georgette on 10 August at 0044Z discovered winds of 45 kt (23 m/sec) and a minimum sea-level pressure (MSLP) of 990 mb. Georgette continued to develop over the next 18-hours reaching minimal typhoon status by 101800Z. Aircraft reconnaissance confirmed this at 102135Z, reporting estimated maximum surface winds of 65 kt (33 m/sec) and a MSLP of 973 mb.

Georgette remained a typhoon for 36-hours, slowed in forward speed, and reverted to a tropical storm again after 120000Z (see Figure 3-10-2). This was apparently due to the proximity of a Tropical Upper-Tropospheric Trough cell to the north and increased vertical shear.

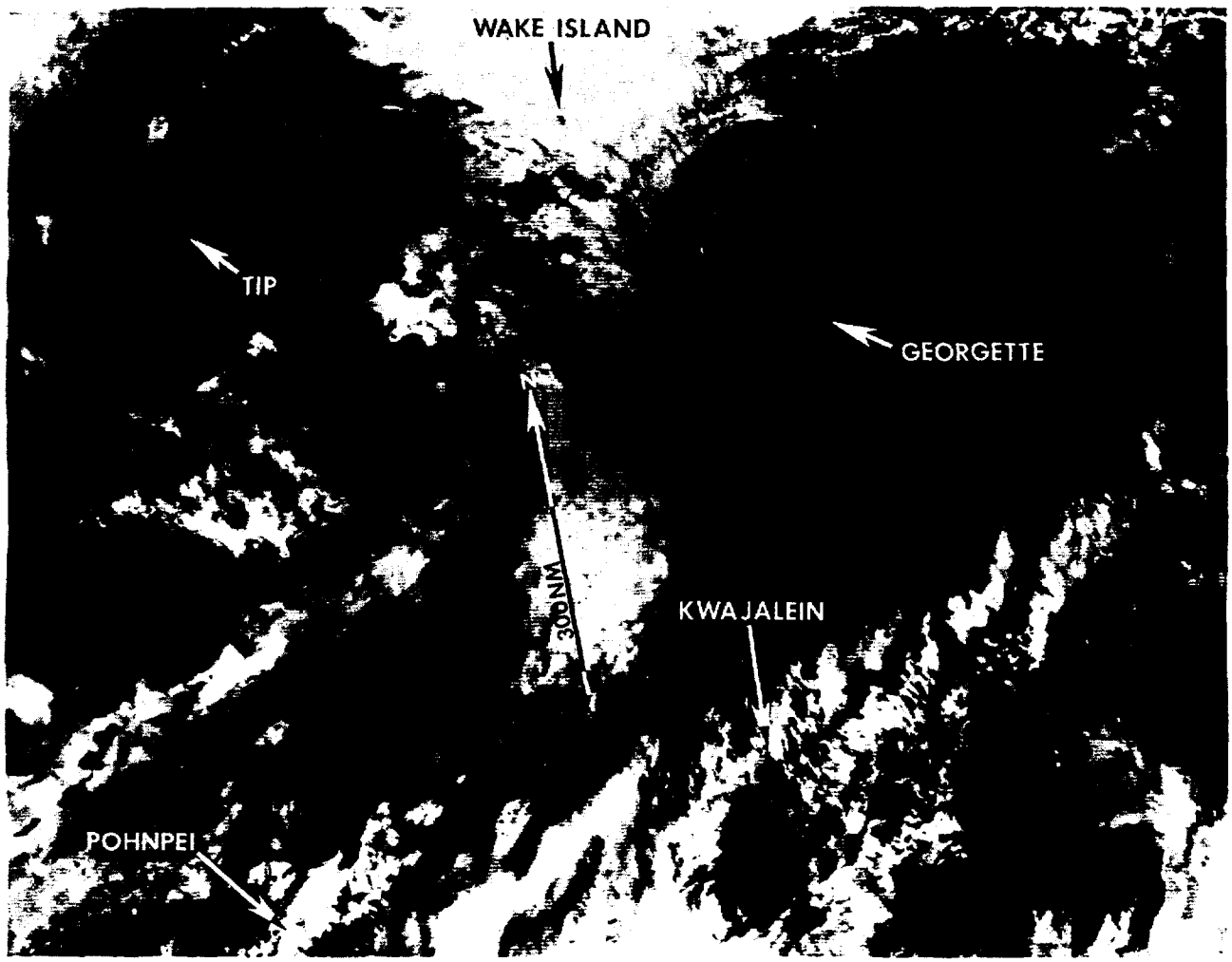

Figure 3-10-2. Georgette (to the east) was weakening as Tip was developing rapidly to its west (121059Z August DMSP infrared imagery).

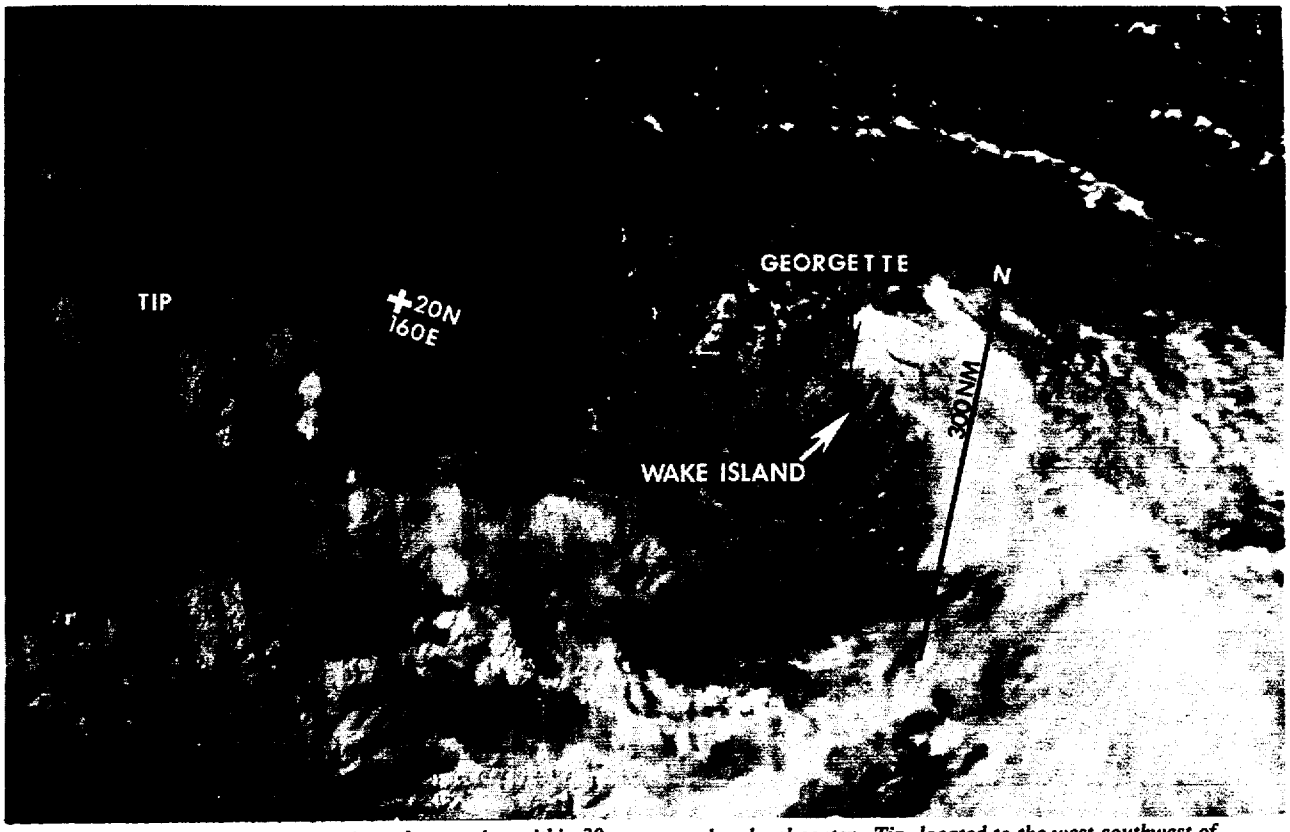

Figure 3-10-3. Georgette just after passing within 30 nm (56 km) to the north of Wake Island. Upper-level shear on the system from the west has exposed the low-level center. Tip, located to the west-southwest of Georgette, was just a few hours away from the first warning (130358Z August DMSP visual imagery).

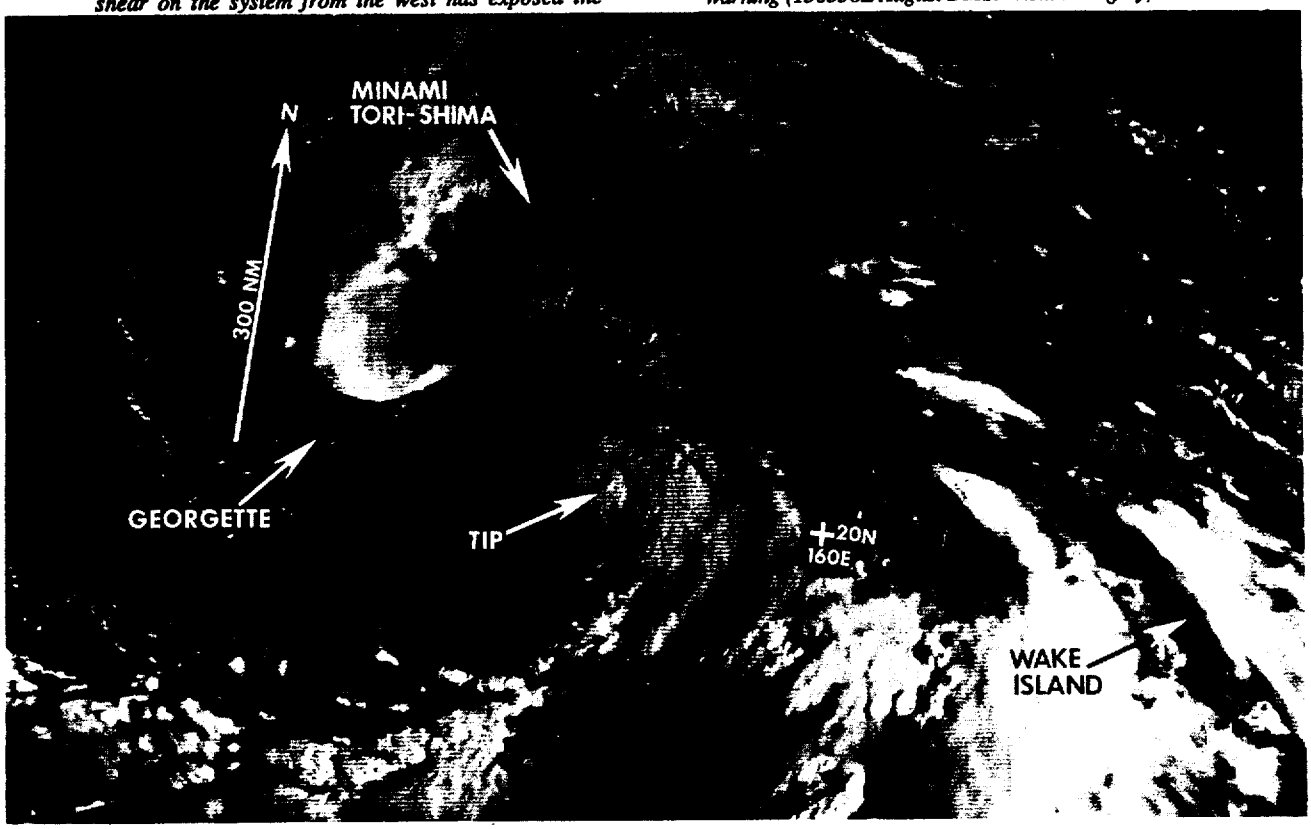

Figure 3-10-4. Tropical Storm Tip as it became the dominant system. Georgette was still a minimal tropical storm and its exposed low-level center was visible as it circled counterclockwise about Tip (142259Z August DMSP visual imagery).

Georgette continued moving toward the northwest, passing almost directly over Wake Island early on the 13th (see Figure 3-10-3). They received maximum sustained winds of 43 kt (22 m/sec) at 130101Z out of the north. No damage was reported by the seven Air Force personnel stationed there. Despite strong shear at upper-levels, it retained minimal tropical storm intensity until after it had circled completely around Typhoon Tip. Georgette weakened to tropical depression intensity for the last time on 15 August (see Figure 3-10-4). Georgette remained distinguishable from Tip for only a day longer (see Figure 3-10-5), then was absorbed into Tip's major convective inflow band.

Tip began early on 9 August as a tropical disturbance located 250 nm (463 km) southwest of Wake Island. The disturbance was placed on the ABPW PGTW by JTWC after it persisted for a day on satellite imagery. The first TCFA was issued at 110430Z on Tip based on an aircraft reconnaissance investigative mission that found a low-level circulation center with maximum winds of 20 to 40 kt (10 to 21 m/sec). The strongest winds were on the north side of the circulation associated with the maximum pressure gradient. The MSLP was 1001 mb.

The second TCFA was issued the next day (12 August) when aircraft reconnaissance did not find a closed circulation center but only a broad surface pressure trough with a MSLP of 998 mb. No substantial winds were noted and the system appeared

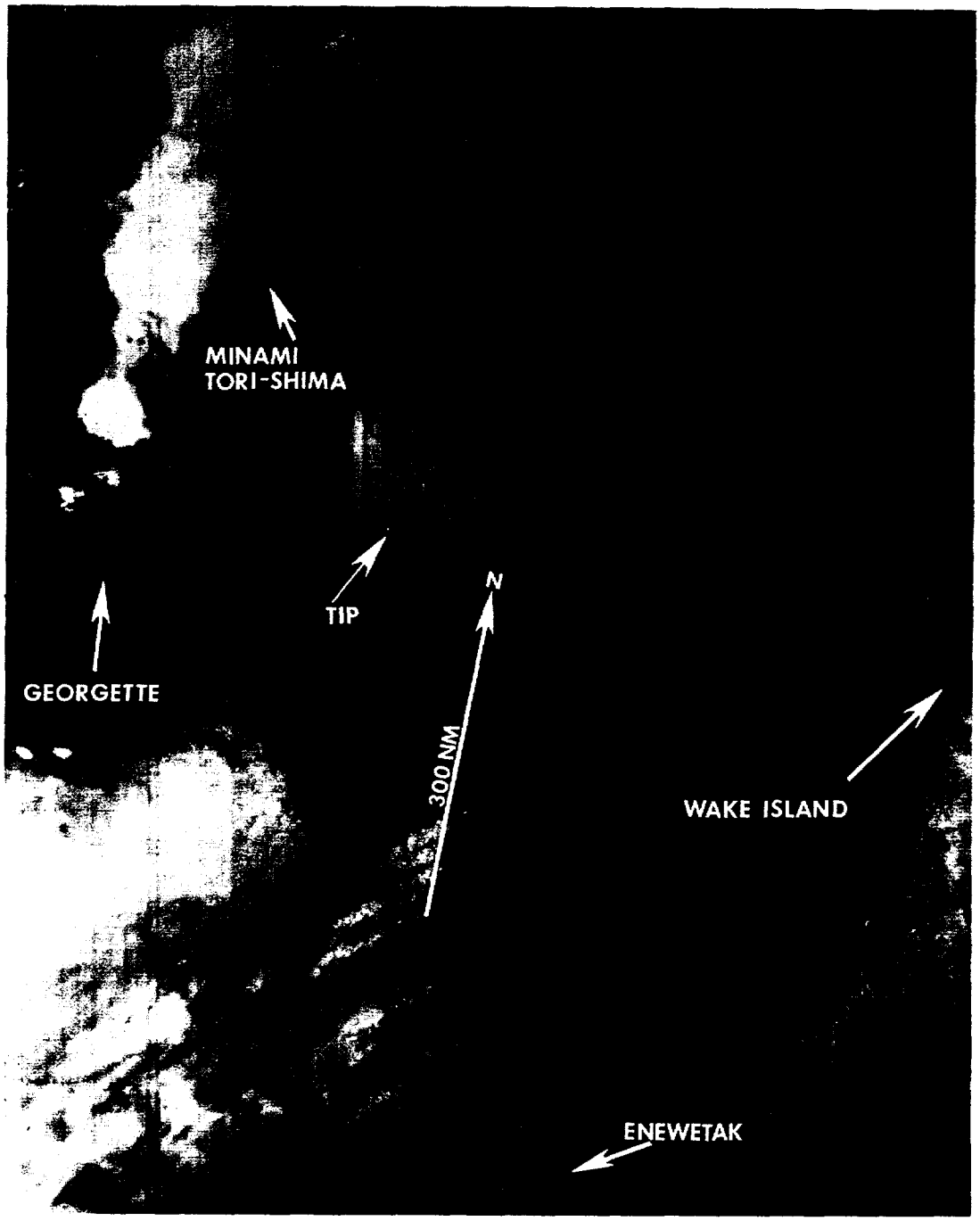

Figure 3-10-5. Tropical Depression 11E (Georgette) retains only its low-level circulation. All the heavy convective activity has become concentrated around Tropical Storm Tip (150336Z August DMSP visual imagery).

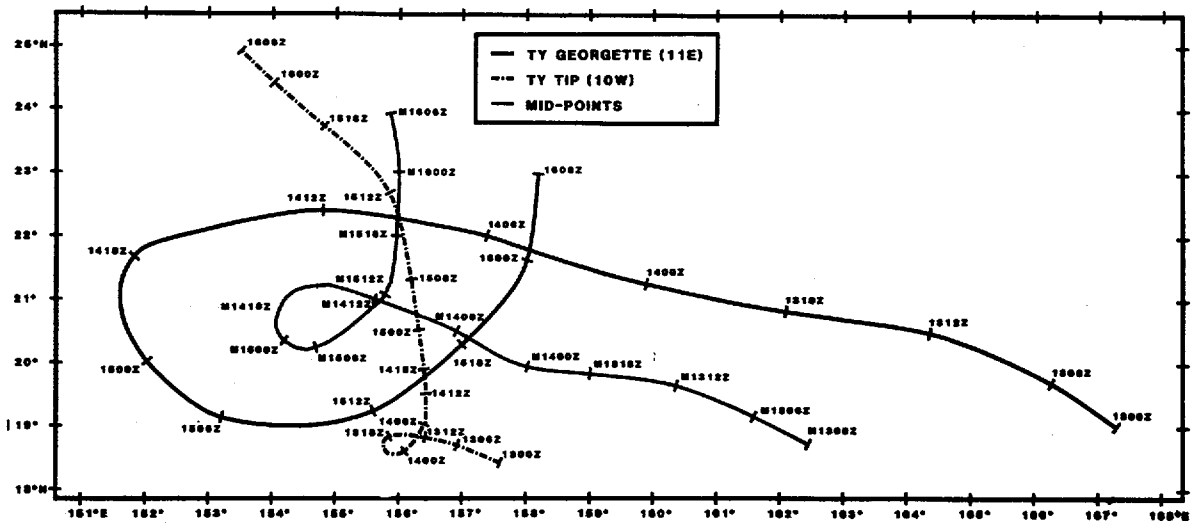

Figure 3-10-6. The binary interaction between Georgette and Tip. The plot of their respective best tracks and midpoints are shown between 130000Z and 160600Z August 1986.

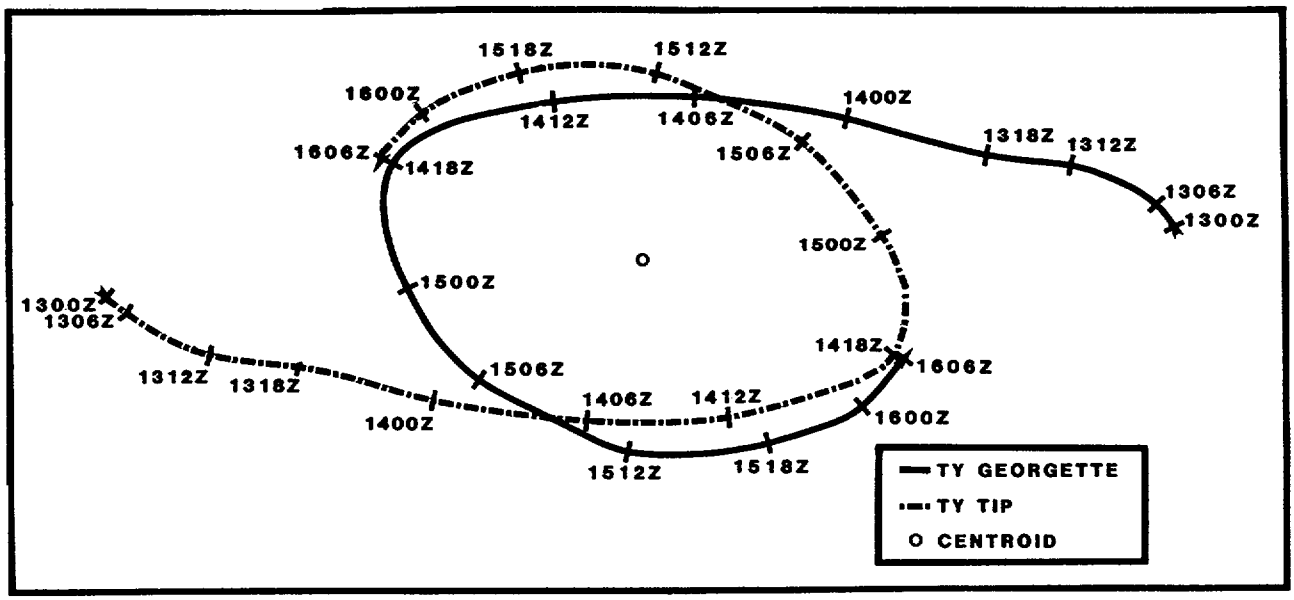

Figure 3-10-7. When the translational motion is removed from both Georgette and Tip, their distinctive center-relative counterclockwise movement about the centroid of their midpoints becomes apparent.

to be quasi-stationary, perhaps due to its proximity to Georgette.

The third TCFA was issued on 13 August without new aircraft reconnaissance information due to the lack of available reconnaissance assets. Later, after an aircraft reconnaissance investigative mission found winds of 50 kt (26 m/sec) and a MSLP of 987 mb, JTWC issued its first warning on Tip, valid at 130600Z. The same aircraft also fixed Georgette 160 nm (296 km) northwest of Wake Island (see Figure 3-10-3). The two tropical cyclones were 450 nm (833 km) apart at this time. At 131800Z, they were only separated by 400 nm (741 km) and it appeared that Tip was capturing the low-level inflow of Georgette and was becoming more intense.

A binary interaction occurred between Georgette and Tip with Georgette tracking west-northwestward and circling around Tip in a counterclockwise motion (see Figure 3-10-6). Initially, Tip was moving very slowly in the same direction, but it eventually did a small counterclockwise loop. Tip benefited from Georgette's passage to the north because it acted as a shield from the unfavorable upper-level shearing effect of the strong westerlies aloft. Removing the translational motion and plotting the relative motion of the two systems about the centroid of their midpoints (Figure 3-10-7) verifies the binary interaction as the pair circled one another in a broad elliptical path.

During the latter part of the binary interaction, as Tip was moving north-northwestward, it increased in intensity and in the process passed over Minami Tori Shima (formerly Marcus Island). At 160600Z, Tip peaked with 80 kt (41 m/sec), then turned to the right on the 17th and headed off toward the northeast (see Figure 3-10-8).

Tip transitioned to an extratropical cyclone on the 19th (see Figure 3-10-9) and eventually dissipated (4 days later) east of Japan. JTWC issued its final warning on the system at 190600Z. No reports of damage or fatalities were received on these two tropical cyclones.

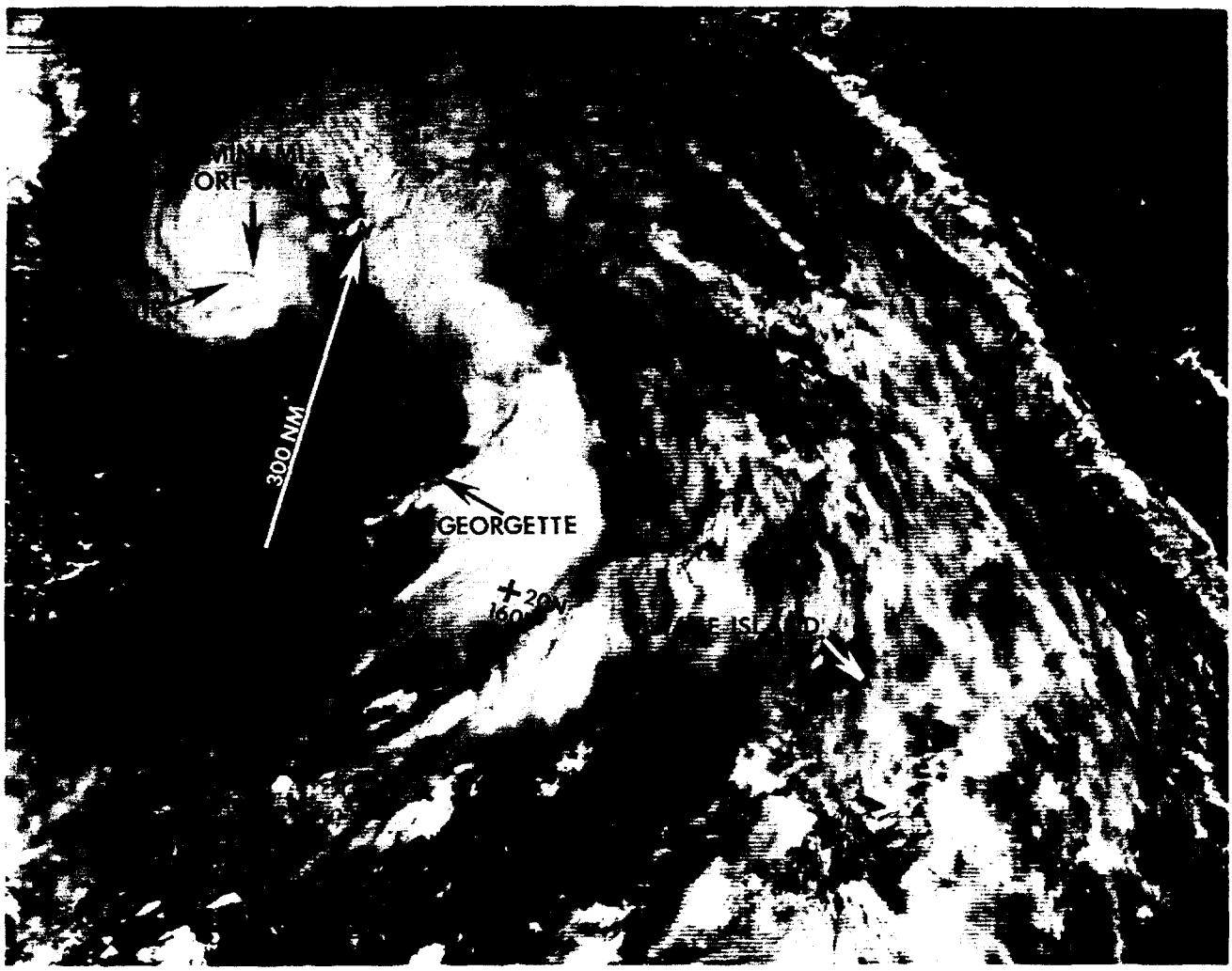

Figure 3-10-8. Typhoon Tip passing within 30 nm (56 km) to the northeast of Minami Tori Shima (formerly Marcus Island) (152239Z DMSP visual imagery).

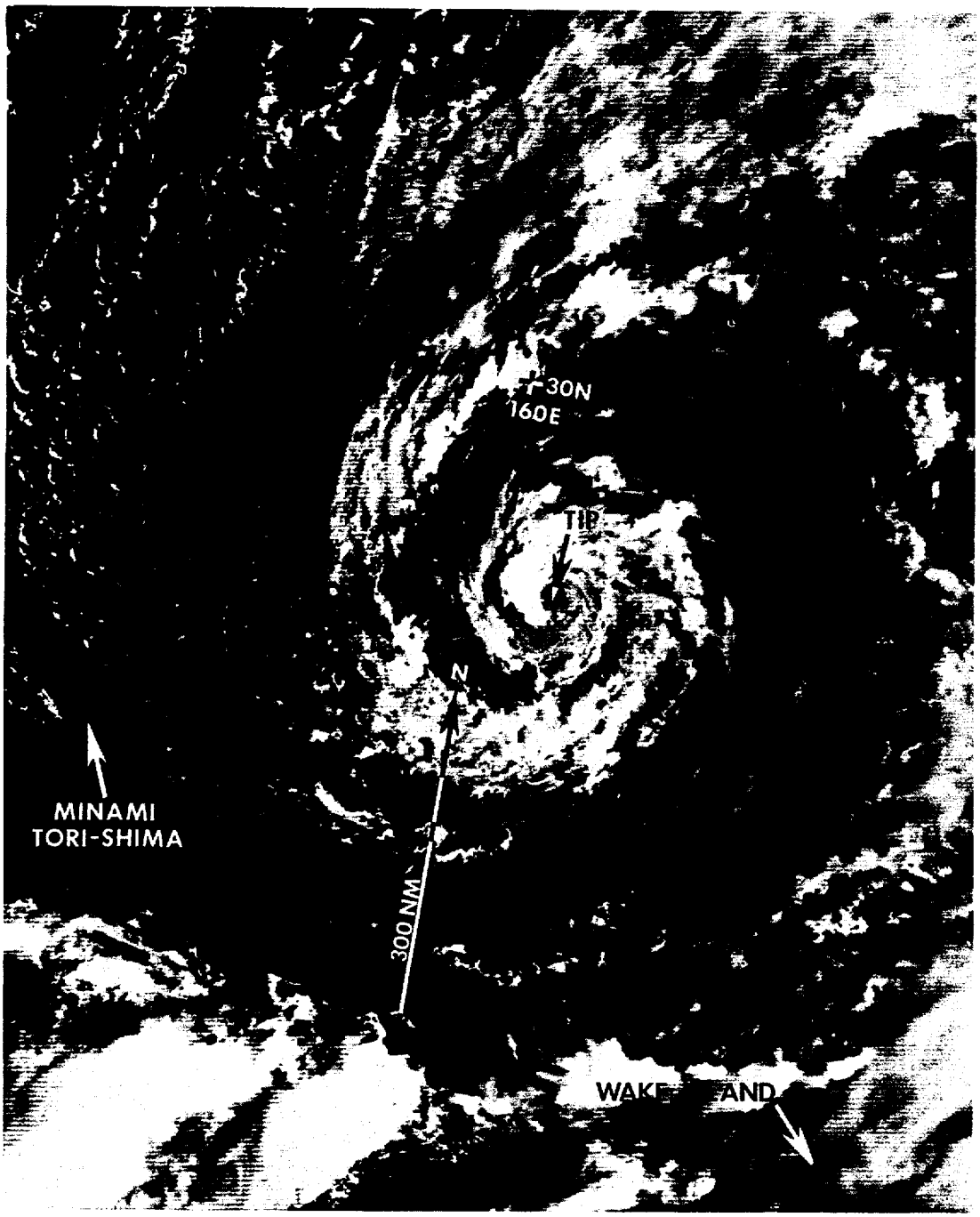

Figure 3-10-9. Tropical Storm Tip becoming extratropical. Note the wrapping of the relatively clear area around the center and the ragged appearance of Tip's central convection (182318Z August DMSP visual imagery).